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WISCONSIN. BUREAU FOR HANDICAPPED CHILDREN  
PROGRAM FOR HEARING CONSERVATION

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# A PROGRAM — FOR — HEARING CONSERVATION



Wisconsin. BUREAU FOR HANDICAPPED CHILDREN  
...  
DEPARTMENT OF PUBLIC INSTRUCTION  
MADISON, WISCONSIN  
1943

Admission



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— FOR —  
HEARING CONSERVATION

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DEPARTMENT OF HEALTH, EDUCATION AND WELFARE  
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1943

## FOREWORD

### A PROGRAM FOR HEARING CONSERVATION

A program for the conservation of hearing must meet several needs: first, it is necessary to discover the children with hearing impairment in order that their hearing may be conserved or improved; second, their condition must be made known to the family that the child may receive medical attention; third, it is necessary for the school to make proper adjustments, provide adequate facilities, and adopt appropriate techniques so that the children may benefit from the school's offerings; fourth, it is necessary that our people know the social and economic handicaps which are produced by hearing deficiencies and that they shall adopt effective programs of prevention. Number four involves not only proper medical care but also the curbing of contagious diseases and a rather complete understanding on the part of the parents and young people of the causes of deafness.

The committee in preparing this material realize its incompleteness and that they have omitted number four entirely. The prevention of impaired hearing is a problem of great importance and of such a magnitude that it involves many agencies beyond the scope of the schools if it is to be successfully solved. The purpose of the committee was to provide some guidance to schools which are at work on a program of conservation of hearing.

We wish to take this opportunity to thank the members of the committee for the preparation of this bulletin: Dr. Robert West, University of Wisconsin; V. A. Becker, Superintendent of the State School for the Deaf; and Joseph Rohr, Jr, formerly state supervisor of the state-wide hearing survey.

FRANK V. POWELL, *Director*  
Bureau for Handicapped Children

## INTRODUCTION

We know that children are different and if we are to adjust the school to their needs it is necessary that we know in what ways they differ. Hence, the emphasis in present educational practice with the child who seems not to be living up to his potential ability is upon a complete survey of his assets and liabilities. The case study approach to child problems has justified itself not only in rehabilitation of the child who is obviously maladjusted, but also in the prevention of maladjustments in the child who presents as yet no obvious signs of a serious problem. One of the ways in which children differ is in their hearing acuity. Beyond question, deficiencies of hearing show themselves as a cause for many maladjustments of children. If one surveys the groups of children who present educational problems, he finds the children defective in hearing distributed in many of these groups, especially in the following: speech defective, emotionally unstable, socially maladjusted, delinquent, and those failing to make satisfactory school progress.

The responsibility for the analysis of the problems presented by the maladjusted school child rests, of course, upon the school administration. The superintendent ordinarily leaves this as a responsibility for a committee of selected teachers or to a special director who is responsible for the case studies of the children of the system. This director of child study is also responsible for co-ordinating the activities of persons or agencies in the community upon whom the school must rely for help in appraising the problems of children being investigated. It is advisable and frequently arranged that these co-ordinating individuals and agencies be organized in a committee or a child-study council. Such a committee may be made up of (1) the child-study director, (2) teachers of exceptional children, (3) the school nurse, (4) a physician representing the city or county medical organization, (5) a representative of the family welfare agencies and (6) representation from any service club, parent-teacher association, or other organization that may have, for the time being at least, a project looking toward the betterment of the entire educational program.



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## DISCOVERING THE CHILD WITH IMPAIRED HEARING

How shall we discover the child who is handicapped by a hearing loss? There are several methods of selecting the one out of every ten children in our schools who have hearing impairment. (Most writers state that from 10 to 15% of all school children have some hearing impairment while approximately 2% have sufficient loss for it to be a serious handicap). No one method will be found most suitable for all communities because of variation in financial status, personnel, or other practical problems which may be present that make it impossible to use one standard procedure. Therefore, the following four methods for finding the child with hearing impairment are suggested with the hope that one of them will prove adaptable to every community or school organization considering a program for adjusting the school to better meet the needs of all its children:

*Method 1* is a simple approach to the screening out of children with some hearing difficulty and one that can be carried on by local organizations before the individual audiometer is actually brought in to detect the hearing difficulty. This approach necessitates the selection, according to definite criteria, of certain children by the local health and school authorities. The criteria are:

- (a) Teacher selection of children thought to have some hearing difficulty as observed in the classroom.

All teachers of all children should know the common *identifying characteristics* of children with impaired hearing so that delay in proper placement may not further retard the child's school progress. Some or all of the following may indicate deficient hearing: (1) lack of attention, (2) lack of interest, (3) tendency to withdraw from group discussions, (4) constant request for the teacher to repeat her questions—frequent use of "what" by the pupil, (5) language difficulties, (6) omission or substitution of speech sounds, (7) behavior problems (8) frequent colds, throat and nose infections, running ears, earache etc.

These characteristics may be due also to some physical or mental maladjustment other than impaired hearing. Where there is overlapping of the above characteristics a most careful diagnosis should be made.

- (b) Teacher selection of those children with a reading difficulty,
- (c) teacher selection of children with any type of speech defect, except stuttering, (d) teacher selection of children who have failed to pass the previous semester or semesters, or have recently done poor scholastic work, (e) teacher selection of children thought to have some social or emotional maladjustment, as observed in the classroom or by the parents at home, (f) selection by the school health department or nurse, of children who have a record of a medical history of diseases of the ear.

*All children who have been reported for any of the above traits should receive a test on a pure tone audiometer.*

The *advantages of preselection* are that (1) it is inexpensive, (2) it provides education for the teacher and the nurse in the problems of hearing impairment, and (3) it is a method that can be employed in a limited organization set-up.

The *disadvantages of preselection* are that it may fail to find some children who are impaired as to hearing, especially those with high frequency impairment.

*Method 2 first* employs the technique described in method 1. *Next*, supplementing method 1, all other children in the school are given a quick test on a group audiometer employing a high-frequency-tone phonograph-record test. Children who fail this record test are then ready for a test on a pure tone audiometer.

The *advantages* of this method are that it is more accurate than method 1, in that it is more likely to discover high frequency cases than is method 1. The *disadvantages* are that it may not discover all of those needing referral to the otologist.

*Method 3* necessitates the testing of all children with a phonograph audiometer using a digit speech record. All children who fail this are then ready for a test on a pure tone audiometer.

The *advantages* of method 3 are that every child is given a test of his understanding of speech. The *disadvantages* of method 3 are: (1) that this method requires a thorough organizational set-up, (2) that it consumes considerable time, and (3) that it may not select high frequency cases.

*Method 4* is a rapid "sweep" test employing a pure tone audiometer. It makes no attempt to find the severity of the hearing impairment but only to establish that some does exist. All children who show that some hearing impairment does exist are now ready for a test on a pure tone audiometer (step 2).

The *advantages* of method 4 are that (1) it necessitates no equipment except that used in Step 2, (2) it disturbs classes less than either Methods 2 or 3, and (3) it is an accurate "screen". The *disadvantages* of method 4 are that (1) it does not discover the word-deaf-auditory aphasics, and (2) it does not test the understanding of speech.

#### EXPLORING THE CHILD'S HEARING POWER

Now that the child with hearing impairment has been found, it will be necessary to explore his hearing powers to determine *precisely* at which *frequencies* he hears the *most* and the *least*. After that analysis has been made, the proper authorities, educational and medical, will be in a position to make recommendations relative to the educational placement and medical services required to meet the child's needs and condition.

The final analysis of the individual's auditory functions should be made with one of the accepted Pure Tone Audiometers. The audiometric readings should be recorded on a test blank, so that computations can be transferred to an *audiogram*.



## INSTRUMENTS REQUIRED FOR DISCOVERING AND EXPLORING A CHILD'S HEARING POWER

The *group audiometer* is an instrument equipped with multiple outlets for individual phones and is usually capable of testing as many as thirty children at a time. The records available, at present, to be played upon its phonograph, fall far short of ideal test material. The number records have the disadvantage of being merely of recognition of seven spoken digits. There are many good adventitious cues in these records by which persons having very definite losses in the speech range of hearing can identify the numbers spoken. The test falls far short of being either a test of auditory acuity or a test of understanding of speech. Records are available of a test by continuous tones arranged in simple patterns that one can identify and record upon his blank. Two of the parts of this test are apparently correlated highly with the results of the individual audiometer. The rest of the test seems inadequate and misleading in its scores. The disadvantages of these records is that they do not *uncover* the child having a good ear but lacking the *ability to interpret* what he hears. Insofar as this test measures any auditory function, it assays the acuity of hearing.

Many experimental records have been produced involving spoken words. No good records of this type have yet been produced for general distribution. If one desires to make for his own use such recordings, they should be graduated in intensity from a very faint to a very high level of amplification, and should involve words in the working vocabularies of persons tested, these words being employed in connected speech in conversational style.

It goes without saying that the phonographs upon which these records are to be played should be mechanically rugged. There are two basic circuits involved in these phonographs. One circuit involves a crystal phonograph pick-up and phones, while the other uses magnetic pick-up and phones. Each has its advantages and disadvantages. The magnetic pick-up and the magnetic phones are more rugged and will stand more abuse than the crystal type. The magnetic units may, however, get out of calibration after long use. Since the instrument continues to function, the tester may be misled into assuming that he is getting accurate results. The crystal units are more likely to go completely bad when they are out of adjustment, hence, they give clear indication of their defective condition. One great disadvantage of the crystal units is that exposure to high temperature and humidity will disintegrate the crystal. Leaving the instrument near a hot radiator or lying in the bright sun or even packed in a car standing in a sunny parking lot in the summer, will damage the instruments. These considerations should be known by the persons *selecting and using* these group audiometers.

There are a number of *individual audiometers* on the market. In selecting one, several considerations should be kept in mind. First,



ruggedness: if the instrument is to be carried about from place to place it is important that the chassis be mechanically rugged. This ruggedness of construction should be demanded even though it may somewhat reduce the portability of the instrument. Second, if the machine is to be used for sweep testing, the controls should be so constructed that changing from one frequency to the next can be accomplished conveniently and accurately. Third, if the instrument is to be used in areas not provided with electric power or in buildings not equipped with convenient outlets for electrically-powered sets, a battery-equipment set should be selected. Fourth, the electrically-powered sets employ an amplifier using several vacuum tubes. These tubes change in their operating characteristics as they get older, thus the sets give misleading results. The battery-powered set is usually more constant in its output than the electrically-powered sets. A frequent check of the tubes with the electrically-powered sets is an absolute necessity, hence, a ready access to the vacuum tubes is a desirable feature of such instruments. Fifth, if one chooses the electrically-powered set, one should make sure that the set will operate on the power supply available. Some sets operate on AC as well as DC lines, others operate only on DC lines. Sixth, some audiometers have checking devices by which the instrument may be calibrated at the beginning of each testing period. Some have calibrations for intensity levels, and some for frequency levels. The more of these checks the instrument possesses, the more accurate will be the results *if the tester takes the trouble to use them*. If, however, the tester does not employ these checks, the results on these instruments will be less accurate than on instruments that have fixed calibration. Seventh: an individual audiometer may be equipped either with a magnetic phone or a crystal phone. The same considerations should be kept in mind in selecting the type of phone as have been suggested above for phones employed in the group audiometer. Eighth: it is sometimes disconcerting for the purchaser of an audiometer to discover that the decibel ratings on his instrument are not in intensities equivalent to those on an audiometer on another make. The fact that the manufacturers of audiometers have not brought their instruments to a standard calibration may seem to some an important consideration in the selection of an audiometer. As a matter of fact, it is a very minor factor. It is only important to know *how* the audiometer one is employing compares in its intensity levels with other audiometers in general use, so that the tester may make comparisons between his audiograms and those that others obtain on other instruments. If the output of an audiometer varies, in each of the frequencies tested, through a sufficient range of intensity beginning well below the average threshold of hearing and approaching within at least 30% of the threshold of pain, the audiometer may be regarded as quite satisfactory in its intensity output and will be serviceable in any practical survey of hearing.

There is today no recognized "correct" standard of decibel ratings. Accuracy of frequency and purity of wave form are much more important than standardization of intensity levels. Of course, the changes from one level of intensity to another, five decibels above or below it, should be accurately calibrated, but there may be considerable variation in the level of the zero points of intensity.

#### THE OPERATOR OF AN AUDIOMETER

Particular attention should be given to the *personal qualities* of the audiometric technician. Just as only certain types of individuals make successful doctors or lawyers, so is it highly essential that the audiometrician have certain specific personal qualities, such as the following: (1) *an abundance of patience* (2) *understanding of the child*: a. his nervousness, b. his copying or cheating, c. his language, d. his general responsiveness, his health and fatigue (3) *conscientious regard for accuracy* (4) *ability to make the child feel at ease*. The audiometrician must be willing to efface completely his own importance in the testing situation and assume so impersonal a role that the child will feel no fear of making honest and immediate response to the test situation. The operator should so conduct himself as to seem to the child to be merely the operator of the instrument and not the judge or critic of the child being tested.

The testing of school children by means of audiometric instruments should be entrusted only to *adequately trained people*. This preparation is in part measured by the credentials possessed by the tester. These should include a teacher's license and a college diploma, in the earning of which the student pursued courses in speech correction or education of the deaf; and in connection with which actual training and experience in the use of audiometers was afforded the student. In some instances the testing can be done by nurses and other professional workers who have had backgrounds that would enable them to understand the problems of the deaf and who have had considerable practical experience with audiometers. It is important, however, that persons entrusted with the program of testing for school adjustment purposes be directly responsible to the school system and conduct the testing in such a manner as to furnish the school with information of special value to the system. Hence, it is usually best that the testing be done by a licensed teacher.

#### WHAT IS AN AUDIOGRAM?

The status of a child's hearing represented in the form of a curve on the proper blank provided is called an audiogram. (See the "sample audiogram" of an illustrative case).

#### HOW TO READ AN AUDIOGRAM

A. The "level" of an individual's hearing impairment can be determined by reading the scale at the right or left of the chart.

Referring to the printed audiogram chart, note that we have divided it into four levels. The space above the first dotted, curved line indicates "within the normal range". The second dotted, curved line determines the limits of the "slightly impaired" area, and so on to the bottom dotted, curved line that sets the limits of "total impairment."

B. The "profile" of an individual's hearing impairment can be determined by reading the scale at the bottom of the chart. This is divided into sections by 7 *heavy lines*. It is understood there might be more pitches and thus more sections, according to the type of audiometer used. The vertical lines indicate the pitches of the test tones. Low frequencies are placed to the left, high frequencies to the right and the medium frequencies between.

The curved lines are for right and left ears of a typical case. Noting the "level" of the audiogram for the right ear, the reader will see that, up to the high frequency section, the individual's hearing falls within the normal range. The balance of the line indicates slight hearing impairment at the pitch of 4096 and severe hearing impairment at the frequency of 8192. This person has "high frequency impairment".

The value of an audiogram is that it shows at a glance the "level" and "profile" of an individual's hearing impairment. To the eye of the trained teacher this becomes highly significant.

*Note:* Three types of handicap are frequently confused: the deaf, the feeble-minded, and the auditory aphasiacs. An audiogram will help to classify the type of handicap and will assist in making a proper educational adjustment.

#### PROBLEMS OF HIGH FREQUENCY IMPAIRMENT

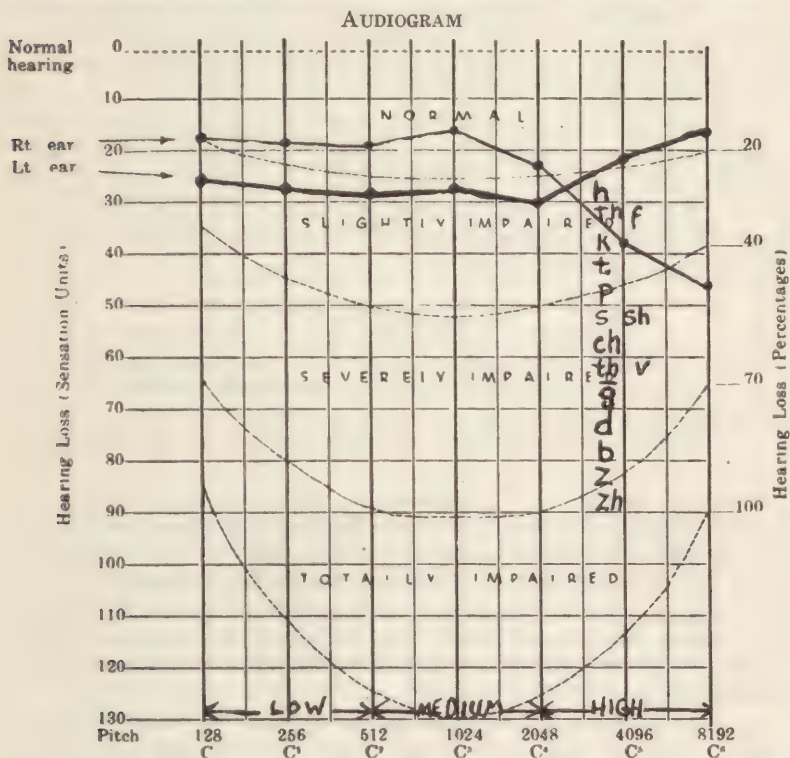
Consonants are a class of high frequency speech sounds that are characterized by constriction or closure at one or more points in the breath channel. Consonants are given either with voice or breath (b, p) (z, s) (zh, sh) (d, t) (th, th) (v, f) (g, k) (j) (ch) (h). Phonetically, w, y, l, m, n, ng, and r are classed as semi-vowels. Most consonant sounds are produced largely within the high frequency range—that is, a pitch range between 2000 and 8000 (Note audiogram). High frequency impairment on an audiogram is indicated when there is a drop or dip in the right end (past 2048) of the hearing line for either or both ears.

Because of various characteristics of consonants, different degrees of high frequency impairment may cause varying grades of hearing and speech difficulties. (Note audiogram). To illustrate, in the case of high frequency impairment:

Deficiencies in the high-frequency range of hearing handicap the hearer in two ways: (1) They prevent his perceiving sounds that are low in intensity; and (2) they prevent his distinguishing between sounds, which, though loud enough to be perceived, are different from



each other mainly in high frequency elements. In the broad sense, *hearing* of a sound involves both the perception of a sound and the distinguishing of that sound from all other similar sounds. Thus only those totally impaired in the high-frequency range would be unable to *perceive* the sound of *v* as in *vow*, but even those "slightly impaired" would have difficulty in *distinguishing* between *vow* and *thou*. The sound elements that are most difficult to *perceive* are naturally the voiceless sounds. In approximate order of their difficulty, they are: h, th, f, k, t, p, s, sh, and ch. (The groups of sounds that present



the most difficulty in *distinguishing* one from others in the group are (again in approximate order of difficulty): th, f; th, (voiced), v; k, t, p; g, d, b; s, sh; z, zh.) Thus the sounds that stand first in these two lists would be the first to be lost in the hearing of a person with progressive high-frequency deafness, and, as his loss becomes greater and greater, he loses more and more sounds until he can no longer distinguish between even such words as *ruse* and *rouge*.

For practical classification we may say that: (1) under conditions of ordinary conversation, a person who is "slightly impaired"

in the high-frequency range will have difficulty in hearing the sounds h, th, f, k, t, and p, except when these sounds are stressed as at the beginnings of words or phrases; (2) a person who is "severely impaired" will have difficulty in hearing these same sounds and also s, sh, ch, th, (voiced) v, g, d, b, z, and zh; and (3) a person who is "totally impaired" in the high-frequency range will be wholly unable to hear any of these consonants.

The accompanying chart displays these sounds in terms of the approximate percentage of hearing loss at which each of the consonants will disappear. A person whose loss has exceeded one of these limits will be able to "hear" the consonant in question only by lip-reading, by context, or by interpreting from the adjacent sounds what consonant was spoken.

It should be recognized that, since the young child probably will reproduce the sounds that he hears used, his difficulties in speech with the high frequency consonants will be in direct ratio to the "level" of the high frequency end of his hearing line. Lastly, it should be remembered that the audiogram may change from time to time to show changes in hearing.

#### SURVEY FOLLOW-UP

Once the child with hearing impairment has been located, the next step is to attempt to adjust him emotionally, medically, and educationally. Therefore, the success of a hearing impairment survey will be dependent largely upon the thoroughness of the follow-up program.

Since the subject of the follow-up is the child, and the end in view is his proper adjustment to his hearing impairment, every effort should be directed toward the realization of that objective. Every school organization will have its own local methods of inter-relationships, referral techniques, recommendations, and the filing and distribution of such data. The solving of follow-up problems should, therefore, first involve the child and secondly, the practical local situation.

Since the school is an organization that probably can most efficiently co-ordinate the activities of follow-up, it is felt that the school should be responsible for the following suggested approaches which are dependent on local problems and should thus be locally administered:

##### A. Routing of data to the proper persons or agencies.

1. Data: (a) findings, (b) explanation of their educational significance, (c) solicitation of co-operation, information or recommendations.
2. Suggested persons or agencies: (a) family, (b) physician, (c) health department.

- B. Collection of information gathered or produced by suggested persons or agencies.
1. From the family: (a) attitude of family toward medical treatment, (b) economic resources for medical adjustment, (c) information relative to child's physical and emotional check-up.
  2. From the physician: (a) report on medical examination, (b) recommendations.
  3. From the Health Department: (a) school health record.
  4. From the school: (a) educational record.
- C. Local child study conference—analysis of facts collected and decisions relative to child adjustment. The members of such a conference may be: (a) parents, (b) physician, (c) school nurse, (d) teacher, (e) principal, (f) child guidance director, (g) mental hygienist;

The facts to be collected by the conferences should be pertinent data obtained from: (a) the family, (b) the physician, ((c) the health department, (d) the school;

The decisions to be made involve: (a) medical treatment, (b) educational adjustment; and a report on the decisions of the conference should be made to: (a) the parents, (b) the physician, (c) the local school department, (d) the health department, (e) the State Department of Public Instruction, Bureau for Handicapped Children.

#### THE ADJUSTMENTS OF THE SCHOOL TO MEET THE NEEDS OF THE CHILD

School administrators and teachers are interested in the problem of hearing impairment when they are once made aware of its presence in their school. They are often confused by technical terms in reports, and often do not know what to do about a child who has some hearing difficulty.

Teachers and administrators should be supplied with a usable terminology and should be offered suggestions for educational handling of those children with a hearing impairment, so that they can approach the problem intelligently.

Each group of children has been set up on a basis of the *amount of hearing* that is usable to the child, rather than the *percentage of loss* as shown on the audiometer. For example, instead of saying that a child has a "20% hearing loss", it is recommended that this case be referred to as having "80% hearing". Thus, the four groups are defined in terms of the amount of hearing still retained rather than in terms of a hearing loss.

In an attempt to solve the problem of effectively supplying the school person with the information necessary to recognize, classify and handle cases of impaired hearing and in place of speaking of all children with hearing impairment as deaf or hard of hearing,



we are suggesting these four classifications: (a) those with *Normal Hearing Range* (those with 80% hearing or more), (b) *Slightly Impaired* (those who have 60% to 80% hearing), (c) those who are *Severely Impaired* (who have 30% to 60% hearing), (d) those who are *Totally Impaired* (who have 0 to 30% of their hearing).

*Composite Hearing*—audiograms of the individual's right and left ears often show complementary profiles so that, when used together the composite audiogram shows a curve that is nearer the normal than either one of the ears taken independently. Therefore, all hearing percentages are based on an analysis of the "composite hearing".

The percentages used in the four classifications will be determined by testing 128 d.v. through 8192 d.v. Percentage of hearing indicates the percentage of hearing left as calculated in the light of our present knowledge.

#### CLASSROOM OR EDUCATIONAL ADJUSTMENTS

*It's difficult to classify children into hearing groups. Hearing, like all other child factors, is highly individualistic. All classification of children in schools is largely for administrative purposes and should not be permitted to interfere with proper child development. There are so many factors involved in hearing that its individualistic aspects can not be overemphasized; they are as varied as those of intelligence. These classifications are based solely on the measurable functions of auditory acuity and do not include other factors such as intelligence, visual acuity, age at onset of hearing impairment, efficiency of the auditory association areas of the brain, and home training in language.*

In all cases where a child is to remain in a public school with hearing children, a careful explanation should be made to the teacher as to the nature of the problem and the best way for her to handle it in her particular classroom. *Two children having the same amount of usable hearing may require entirely different educational adjustments.* The following paragraphs are suggestive and may prove helpful in adjusting the school to a child.

*Normal Range*—most of these children do not require any special attention as far as educational procedure is concerned, although a few of them might be placed in the front of the room. If the deficiency has a tendency to be progressive, an otologist should be consulted from time to time, and individual hearing tests should be given at least once a year.

*Slightly Impaired*—all children in this group should be placed in the front of the room. Most of them can remain in a public school, especially those whose speech and language habits had been formed before the impairment took place. Those children whose impairment occurred at birth or in infancy will usually profit from lipreading and, if speech defects have come as a consequence of the hearing impairment, speech correction; and it is usually advisable to place children

of the latter group in a special class. High school and university students in this classification invariably can get along where they are. An individual hearing aid is advised for those mature enough to take care of it, especially those whose hearing remainders are nearer 60% than to 80%.

*Severely Impaired*—this group have lost much of their sensory ways of learning facts and so present a real school problem and require special facilities and techniques. These children (a) *should be receiving training in a special class* (a day school or residential school for the deaf), (b) *should have daily access to a group hearing aid over an extended period until it has been definitely proven that they do not have sufficient hearing to justify continued use of the instrument*, and (c) *an individual aid should be provided for those who can profit by it when they are mature enough to take care of the instrument*.

*Totally Impaired*—if the children in this group are to be educated they (a) *must be trained in a special class* (a day school or residential school for the deaf), (b) *should have daily access to group hearing aid over an extended period until it has been definitely proven that they do not have sufficient hearing to justify using the instrument*, and (c) *individual aids should be provided for those who can profit by them when they are mature enough to take care of the instruments*.

It is not a good educational policy to house these groups in the same classroom.

#### *General Suggestions to Public School Teachers*

1. The child with impaired hearing who is to remain in the public school should be seated near the center of the room in a front seat. This position will enable him to see his teacher's face and to hear her voice more easily.
2. The child should be encouraged to watch the face of the teacher whenever she is talking to the class.
3. The teacher should try to face the child with impaired hearing as much as possible when she is speaking to the class. She should try to give all important instructions from a position fairly close to the child and with a normal amount of light on her face.
4. The teacher should avoid using excessively loud speech or exaggerated lip movements in speaking to the child with a hearing impairment.
5. The child with hearing impairment should be encouraged to watch the faces of children who are participating in class activities.
6. If a choice of teachers is possible, the child with a hearing impairment should be placed with the teacher who enunciates clearly.
7. We are likely to overestimate the hearing efficiency of the child with hearing impairment because when he is paying close atten-

tion he apparently hears quite well. It is to be remembered that this child is hearing at the expense of greater effort than the child expends who has normal hearing. It is to be expected that it will be difficult to hold the attention of the child with a hearing impairment.

8. A severe hearing impairment that lasts over a period of time tends to result in a dull, monotonous voice and inaccurate diction. Therefore, that child should be encouraged to speak clearly. Keeping the child "speech conscious" will help him to resist the usual damage to the voice that a severe hearing impairment produces.
9. Interest in music should be encouraged, especially participation in vocal music.
10. Since a hearing impairment is a defect which affects the language processes, the child should be encouraged to compensate by a more active interest in all language activities; reading, spelling, original writing, etc.
11. The child should be carefully watched to be sure that he is not withdrawing from the group or that he is not suffering a personality change as the direct result of his impaired hearing.
12. *All special considerations that are shown the hearing impaired child should be handled so as not to call attention to the defect.*
13. The nurses and teachers should be especially vigilant in noting common colds, influenza, throat and nose infections, tonsillitis, running ears, etc., in the hard of hearing child. If at all possible, these conditions should be prevented. When they do occur, they should receive medical attention as quickly as possible.
14. The child's hearing should be tested on an individual audiometer at least once a year.

#### HEARING AIDS

The selection of a hearing aid for children in whose cases such instruments are feasible, should not be left to the unadvised and these brief comments are added here as a help to teachers from whom advice may be sought. The selling of hearing aids is highly competitive; and the parents must be protected against zealous persuasion. One should know what to expect of a hearing aid, and what faults to guard against. The characteristics of an ideal hearing aid are as follows:

*Lightness and inconspicuousness.* The instrument should be so engineered that it can be worn without inconvenience and without attracting undue attention to the wearer's defect. However, the smallness of the instrument should not be achieved at the expense of ruggedness and acoustic efficiency. It is a matter of history that when spectacles were first worn the wearers felt ill at ease because they attracted unfavorable attention. The public has now become used to the spectacles and will, no doubt, some day become as used to hearing aids.



The hearing aid must be so engineered as to compensate as accurately as possible for the individual auditory characteristics of the wearer. It thus must be engineered to fit his own audiogram. In some cases this would involve merely a general amplification of all of the sounds of speech. In some, it would require a suppression of some of the sounds with an accentuation of others. This special engineering cannot be accomplished satisfactorily without an actual trial of the instrument on the ear of the person who is to use it. A large part of the fitting must be the "cut and try" process. The first step in this fitting process is usually the making of a cast for a plastic earpiece to fit the shell of the user's ear. After this has been provided, the parents should insist that the competing salesmen submit their aids to a rigorous trial so that the best possible instrument can be selected. The plastic earpiece has a standard attachment that will fit all of the acceptable audicles. In a few cases the bone-conduction receiver may be used. This type of instrument needs no plastic earpiece. But the bone-conduction receiver must not be decided upon unless it is clearly evident that this type would be superior in acoustic efficiency to the receiver mounted in the shell of the ear. All too often patients are fitted (or misfitted) with bone-conduction receivers because of the relative inconspicuousness of this type. Acoustic efficiency must not be sacrificed to vanity.

The hearing aid should be provided by a company that has *servicing facilities readily available to the user of the aid*. The parent should take into consideration, therefore, the distance to the nearest servicing center for the hearing aid that is offered them. In selecting the hearing aid, the purchaser would do best in the long run to buy this aid of a company selling him service rather than merely an artificial ear. The buying of a hearing aid should not be like the buying of a ton of coal. The intrinsic cost of the parts of which the hearing aid is constructed is relatively small. The company furnishing the aid should be expected, therefore, to furnish not only these parts, but also the service that will make those parts most efficient in compensating for a defect of hearing.

The *cost of operation* is also an item that must be investigated. The chief cost is battery-supply. Some audicles consume much more current than others. The salesman should be questioned strictly as to the problem of battery costs. This battery cost can often be reduced by providing a large battery for use at the child's desk in the school and a lighter battery for use when the child is moving about from place to place. If this economy is contemplated, the salesman should be asked to provide outlet connections permitting the interchangeable use of these batteries.

The *acoustic efficiency* of the hearing aid can not be tested accurately by trial and error methods allowing the user to judge as to which, of the various instruments, is the best one. He usually

has become accustomed to a distorted form of speech so that he is not a good judge as to how a well compensated hearing aid should sound. He is likely to err then in making his selection of a proper aid. The best testing of such an aid can be done only in the laboratory under controlled conditions. After the aid has been fitted, a training period is often required, before the user can employ it efficiently.

The *cost of the instrument* is an item that should be considered, although there is little relationship between cost and efficiency. In purchasing automobile tires you "get just about what you pay for". It is not always so with hearing aids. In the purchasing of some hearing aids you pay more of your money for advertising and distribution costs than for the audicle itself. The purchaser should also remember that as with spectacles, the cost will often depend upon the complexity of the defect for which the aid is to compensate.

For the use of school children there are two general types of hearing aids—those equipped with a carbon microphone and trans-former, and those equipped with a low output microphone with a vacuum tube amplifier. The use of the vacuum tube instrument is increasing, although in many cases the carbon type is quite adequate.

The parents should beware of any argument that one type is superior to the other. Each type has its uses. Some children may be fitted with one and some with the other.

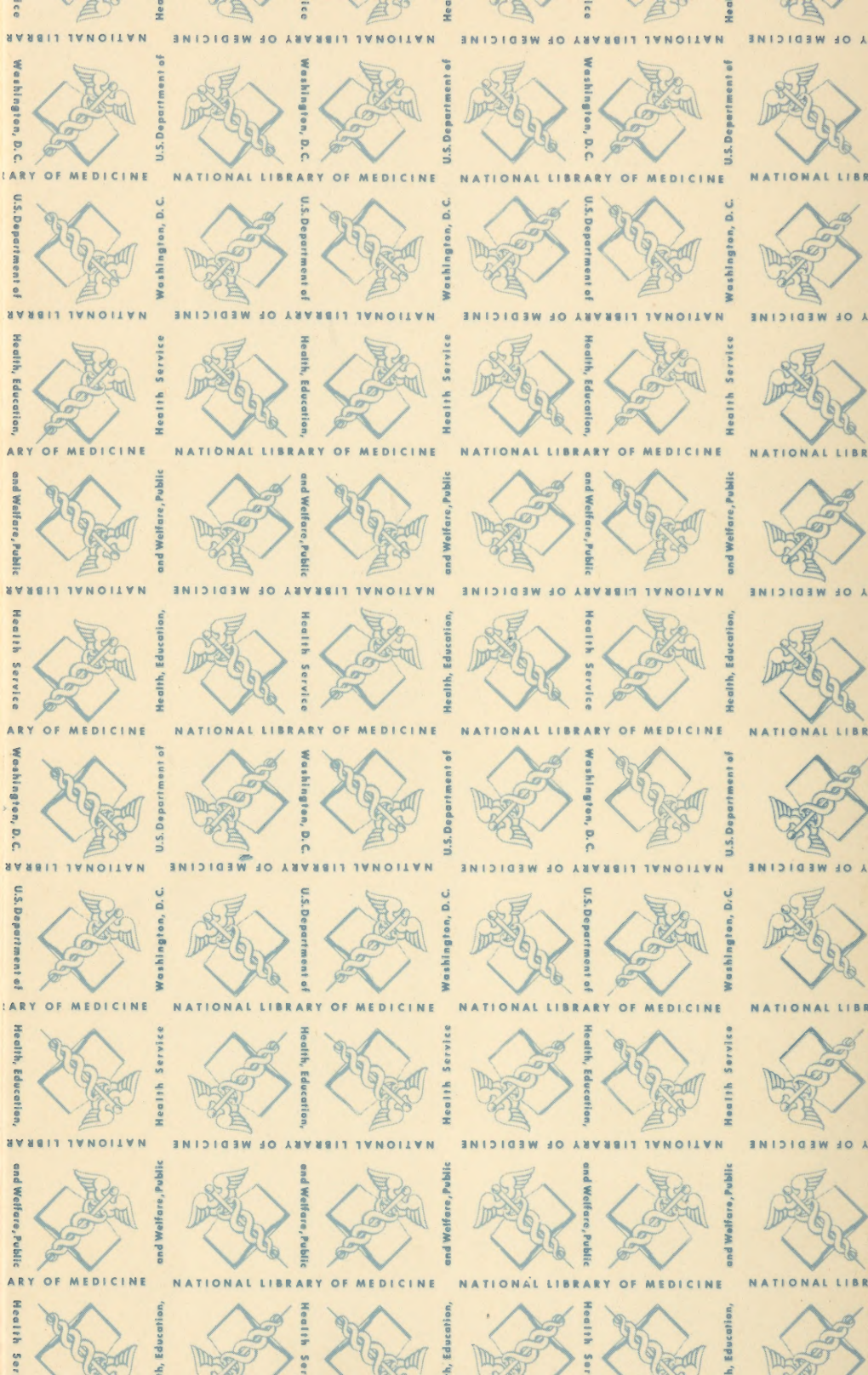
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